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TI Sand mold and core dressings
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CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
GB 1165807	IC	B22C

AB Dressings for sand molds and cores are provided which comprise particulate refractory material suspended in an organic liquid, the suspension agent being selected from hydrogenated vegetable oils. The mold dressing is produced by 1st incorporating the hydrogenated oil into the organic liquid by a high shear dispersing operation to achieve maximum separation of the minute platelike particles. The remaining ingredients of the dressing are then blended into the system. The proportions of hydrogenated oil is 0.2-2.5 weight % of the dressing as a whole. A typical mold dressing composition contained talc (-200 mesh BSS sieve) 23.5, graphite (-200 mesh) 5, coke dust (-300 mesh) 5, bentonite 2, wood resin 3, isopropanol 46.5, and a 5% gel of hydrogenated castor oil in isopropanol 15 weight %. Apart from the improved suspension of the solid particles and the low tendency to packing during standing there is an improved brushability of the dressings and lack of penetration into the sand mold or core, both presumably due to the platelike structure of the hydrogenated oil.

ST sand molds cores dressings; molds sand cores dressings; cores dressings sand molds; dressings cores sand molds; hydrogenated oils dressings cores molds; oils hydrogenated dressings cores molds

IT Molds (forms)
(coatings for cores and, from refractory materials suspended in hydrogenated vegetable oils)

IT Coating materials
(for molds and cores, from refractory materials suspended in hydrogenated vegetable oils)

IT Oils
RL: PRP (Properties)
(hydrogenated, mold coatings from, containing refractory powders)

IT Bentonite, uses and miscellaneous
Coke
RL: USES (Uses)
(mold coatings from hydrogenated oil compns. containing)

IT Resins
RL: PRP (Properties)
(mold coatings from hydrogenated oil compns. containing)

IT 67-63-0, uses and miscellaneous 7782-42-5, uses and miscellaneous 14807-96-6
RL: USES (Uses)
(mold coatings from hydrogenated oil compns. containing)

RN 67-63-0
RN 7782-42-5

RN 14807-96-6

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1,165,807

PATENT SPECIFICATION

NO DRAWINGS

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COMPLETE SPECIFICATION

Sand Mould and Core Dressings

We, FOSECO INTERNATIONAL LIMITED, a British Company of 285, Long Acre, Nechells, Birmingham 7, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

THIS INVENTION relates to dressings for application to moulds and cores for use in the casting of molten metals and more particularly to such moulds and cores formed of granular material such as sand. Sand is the material most commonly used and the invention will therefore be described with particular reference to it. Nevertheless, it is to be understood that the invention applies to moulds and cores made of other materials of the general granular nature of sand.

Sand moulds and cores normally present a relatively uneven surface, i.e. a "rough" surface or a surface containing "voids" to the molten metal, so that the molten metal ends to penetrate into the surface. The resulting cast metal thus has an undesirably rough surface, and may be difficult to separate from the mould or core. This disadvantage is very well realised and several methods have been proposed for overcoming the difficulty, mainly based on the provision of a close-grained facing to those surfaces of the mould or core with which the molten metal is to make contact.

A common procedure is to employ a so-called "facing" sand which is a sand of relatively much finer particle size. When this is applied to the sand mould or core as a facing a relatively much smoother surface is presented to the molten metal so that the cast metal has a smoother surface and is more readily separated from the mould or core. The use of facing sands, especially for moulds or cores of large size, is however relatively costly.

It has also been proposed, with some economic advantage, to use materials other than sand to constitute the facing layer. Thus a mould or core of ordinary foundry sand may be coated with a thin layer of a finely divided refractory material such as powdered graphite talc, silica flour or zircon flour or mixtures of these materials. Such coatings may be applied from a dispersion of the refractory material in a liquid medium which also contains an organic or inorganic bonding agent for the particles. Such dispersions are hereinafter referred to as "mould dressings". The coatings may be applied by spraying, brushing, swabbing, dipping or any other convenient method. The liquid suspension medium may be water, an alcohol, paraffin or a relatively volatile non-inflammable organic liquid, e.g. carbon tetrachloride or methylene chloride. The suspensions usually contain a small quantity of a suspending agent known *per se* to hold the refractory particles in suspension and prevent them from separating out. The fine particles of refractory serve the same function as in facing sand, of filling the voids in the surface of the mould or core so as to present a smooth surface to the molten metal.

As stated above, the mould dressings for foundry moulds and core may contain an agent to assist in maintaining dispersion and suspension of the solid particles in the liquid medium. Such agents frequently achieve the desired result by increasing the viscosity of the liquid phase of the composition by their gelling or swelling action. For example, in aqueous media, one may employ such materials as carboxy methyl cellulose and derivatives thereof, swelling clays (e.g. bentonite), natural gums (e.g. gum arabic, tragacanth, gelatine) or algins. For use in organic liquid media the choice of suspending agents,

[*Price 4s. 6d.*]

is more limited and it has become common to employ organomodified clays such as quaternary alcohol ammonium montmorillonite and similar compounds. Such suspension agents are very useful but they suffer the disadvantage that, although they achieve a low rate of settling, the solid particles tend to form a dense, tightly packed deposit when the mould dressings are allowed to stand for long periods.

In addition, while modified clays function fairly well in non-polar solvents, they are much less effective suspending agents when diluted with polar solvents such as isopropanol.

It has now been found, in foundry mould dressings using organic liquid media, the above difficulty may be avoided by using as a suspension agent a hydrogenated vegetable oil.

According to the present invention, therefore, there are provided dressings for sand moulds and cores and the like which comprise particulate refractory material suspended in an organic liquid medium, the suspension agent being selected from hydrogenated vegetable oils. Preferably, the suspending agent is a hydrogenated unsaturated vegetable oil, for example, castor oil.

It is found that hydrogenated oils of this type will function equally well as suspending agents in aliphatic or aromatic, polar or non-polar liquids.

Preferably, the mould dressing is produced by first incorporating the hydrogenated oil into the organic liquid by a high shear dispersing operation to achieve maximum separation of the minute plate-like particles. A suitable apparatus for effecting such dispersion is a Silverson emulsifier/dispenser. The remaining ingredients of the dressing are then blended into the system. The proportion of hydrogenated oil necessary will generally be of the order of 0.05—5% preferably 0.2—2.5% by weight of the dressing as a whole.

Apart from the improved suspension of the solid particles and the low tendency to packing during standing, certain other improvements have been noted in mould dressings according to the invention. These are, notably, an improved brushability of the dressings and lack of penetration into the sand mould or core, both presumably due to the plate-like structure of the hydrogenated oil.

The following example will serve to illustrate the invention:

EXAMPLE

Two mould dressing compositions were prepared, differing only in the type of suspension agent employed. Thus, each contained

Talc (—200 mesh BSS sieve)	23.5%
Graphite (—200 mesh BSS sieve)	5%
Coke dust (—300 mesh BSS sieve)	5%
Bentonite (high temperature binder)	2%
Wood resin (low temperature binder)	3%
Isopropanol	46.5%

To one composition (dressing A) was added 15% by weight of a 5% quaternary alkyl ammonium montmorillonite gel in isopropanol whilst to the other (dressing B) was added the same quantity of a 5% gel of hydrogenated castor oil in isopropanol. Both dressings were of a consistency suitable for application to foundry moulds and cores by brushing, swabbing, spraying or dipping. The sedimentation rate of the two dressings was compared by thoroughly mixing the dressings and allowing 100 cc of each to stand in graduated glass cylinders. The volume of clear supernatant liquor, which developed as the solids settled, was noted after appropriate intervals of time. In the case of dressing A this volume of clear supernatant liquor was 12 cc after one hour and 43 cc after 24 hours, whilst for dressing B, the comparative figures were only 1½cc and 18cc.

A further test was carried out to compare the packing densities of the solid constituents. This test is described in T. C. Patton: "A simple pigment settling gauge and a simple anti-sag test", Official Digest Federation of Paint Varnish Production Clubs, *29* No. 38A, 10(1957). In this test a perforated disc carried on the lower end of a plunger is placed on the surface of the dressing contained in a vessel of standard dimensions and allowed to fall under its own weight. On coming to rest on the base of the vessel, a calibration mark on the plunger resisters zero on an arbitary scale. If the disc is unable to descend to the base of the vessel because of the presence of packed solids, the calibration mark registers a positive value on that scale. (In this case the scale was graduated in inches). The value indicated increases proportionately with the packing density of the solid particles. A load can be applied to the plunger to cause the disc to penetrate the sediment. When applied to the above two dressings, the following results were obtained:

	Dressing A	Dressing B
After 25 hours	0 (load nil)	0 (load nil)
After 1 week	3.2" (load nil)	0 (load nil)
	1.6" (load 120 gms)	
After 6 weeks	—	1.0" (load nil)
		0 (load 300 gms)

Thus, after 6 weeks, the dressing according to the invention suffered much less packing than a conventional dressing exhibits in one week or less.

WHAT WE CLAIM IS:—

1. A sand mould dressing which comprises particulate refractory material suspended in an organic liquid medium, and including as suspension agent, a hydrogenated vegetable oil.

2. A dressing according to claim 1 wherein the suspension agent is hydrogenated castor oil.

3. A dressing according to claim 1 or 2 wherein the hydrogenated vegetable oil constitutes 0.05 to 5% by weight of the dressing.

4. A dressing according to any of claims 1—3 wherein the hydrogenated vegetable oil constitutes 0.2 to 2.5% by weight of the dressing.

5. A sand mould dressing substantially as DRESSING B hereinbefore described.

6. A process for making a dressing according to claim 1 which comprises incorporating the hydrogenated vegetable oil into the organic liquid by a high shear dispersing operation and subsequently adding the remaining ingredients of the dressing.

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